

Glutamine metabolism in skeletal muscle of glucocorticoid-treated rats.

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Abstract

1. The effect of dexamethasone (30 micrograms day⁻¹ 100 g⁻¹ body weight) on the regulation of glutamine metabolism was studied in skeletal muscles of rats after 9 days of treatment. 2. Dexamethasone resulted in negative nitrogen balance, and produced increases in the plasma concentrations of alanine (23.4%) and insulin (158%) but a decrease in the plasma concentration of glutamine (28.7%). 3. Dexamethasone treatment increased the rate of glutamine production in muscle, skin and adipose tissue preparations, with muscle production accounting for over 90% of total glutamine produced by the hindlimb. 4. Blood flow and arteriovenous concentration difference measurements across the hindlimb showed an increase in the net exchange rates of glutamine (25.3%) and alanine (90.5%) in dexamethasone-treated rats compared with corresponding controls. 5. Dexamethasone treatment produced significant decreases in the concentrations of skeletal muscle glutamine (51.8%) and 2-oxoglutarate (50.8%). The concentrations of alanine (16.2%), pyruvate (45.9%), ammonia (43.3%) and inosine 5'-phosphate (141.8%) were increased. 6. The maximal activity of glutamine synthetase was increased (21-34%), but there was no change in that of glutaminase, in muscles of dexamethasone-treated rats. 7. It is concluded that glucocorticoid administration enhances the rates of release of both glutamine and alanine from skeletal muscle of rats (both in vitro and in vivo). This may be due to changes in efflux and/or increased intracellular formation of glutamine and alanine